

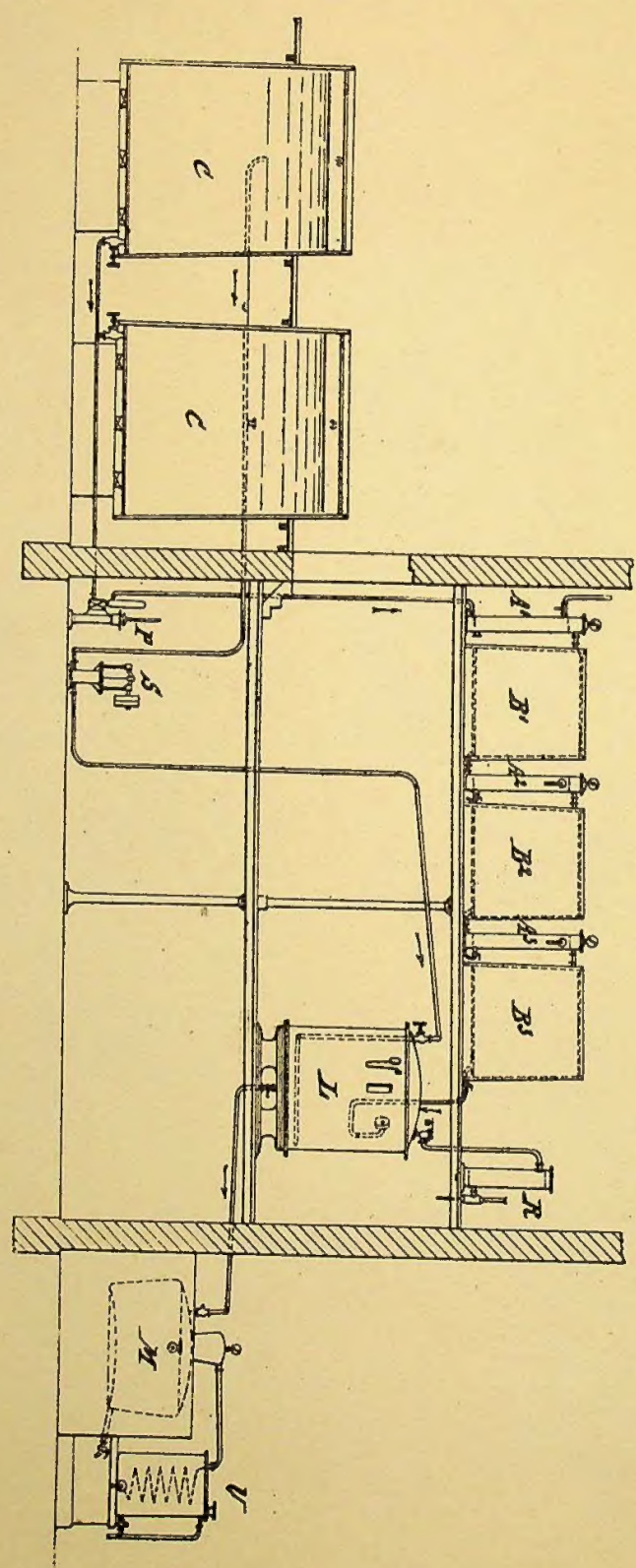
195
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44

A.D. 1899. Aug. 9. N^o. 16,233.
BARBET'S COMPLETE SPECIFICATION.

fermenting
Process 16,233
(1 SHEET)

1900
②

~~1899~~



[This Drawing is a reproduction of the Original on a reduced scale.]

Seen at the column
Accepted Aug. 9, 1899
At. 28, 1900

Processes 45 162 33 1900
 ale 31
 1899
 RECORDED

426/14

Formerly
 Processes

95 DUPLICATE

N^o 16,233



A.D. 1899

Date of Application, 9th Aug., 1899—Accepted, 28th Apr., 1900

dry raisins
 figs
 preserved or fresh apples

COMPLETE SPECIFICATION.

An Improved Manufacture of Alcoholic Spirits and Apparatus therefor.

I, EMILE BARBET, of 167, Rue de Rennes, Paris, France, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

- 5 There is, as well known, considerable distinction between modern distilling on the industrial scale, and the old still process for producing alcohols.
 A hundred years ago only spirits of wines, cider, cherries, cane sugar and molasses were known which were obtained by rude and elementary processes including so-called "spontaneous" fermentations and alembical distillation.
- 10 When industrial distilling made its way finding its raw materials in cheap and abundant agricultural products such as grain, potatoes, beet-roots, artichokes and the residues of sugar (molasses), recourse was had to much more complicated processes. In addition to the introduction of the preliminary saccharification for amylaceous substances, distillers endeavoured to make rapid
- 15 industrial fermentations by introducing beer-yeast to effect continuous distillation and finally to purify the product (which hardly resembled natural spirits) by rectifying, filtering and treating it chemically or electrically, or adding perfumes and the like.
- All these improvements have only served to intensify the difference existing
- 20 between the two kinds of distilling. The old method has preserved intact its supremacy while the industrial distilling only aimed at producing common stuff very cheaply and free from odoriferous substances, alcohol in fact. It endeavoured to destroy all odour of the original substance and approach as closely as possible to chemical neutrality and purity. This neutrality itself,
- 25 however, shews that it was not expected to have any special qualities and all that was aimed at was as few defects as possible.
- The processes which are about to be described are intended to give a fresh direction to industrial distilling, and will result in producing genuine spirit with a delicate flavour as of old, from any cheap agricultural raw
- 30 materials. For this it suffices to follow the ancient processes more closely and to adopt the modern operations thereto, a course from which operators had totally deviated.
- In my preliminary experiments I only considered the possibility of increasing the production of the distillery operated by the vineyard proprietor, and indicated methods of making at the 2nd, 3rd, or 4th distillation of the grape marc
- 35 spirits similar to natural spirit obtained at the 1st operation by ordinary country methods such as are now in use by the vine grower and capable of being employed by him.
- Now, however, I have extended the investigation and aim at a different
- 40 thing. I can now cause the industrial distillery to produce from a raw substance of any kind by means of my process not crude alcohol, but a full bodied "wine spirit" able of competing with naturally distilled wine spirit.

[Price 8d.]

Barbet's Improved Manufacture of Alcoholic Spirits and Apparatus therefor.

All agricultural products which are capable of producing alcohol, such as fruits, cereals, beet-roots and the like have their own special odours.

The first part of the process is to remove the distinctive flavour of the low priced material and to isolate the material producing alcohol in a pure state and eliminate all the rest. From cereals the starch is extracted; from potatoes the flour (fecula), from beet-root the sugar is extracted as would be done for making sugar. 5

When this has been done, it is necessary to reproduce the fermentation of fruits, specially imitating that of those fruits, the flavour of which it is desired to reproduce. 10

The generic characteristic of all natural fermentations of fruits is that they are protected against bacteria and bad odours which result therefrom by considerable organic acidity. Tartaric acid and bi-tartrates in grapes malic acid in apples, citric or tannic acid in other fruits; the percentage of all these acids is tolerably high; one quarter of their equivalent in sulphuric acid would however be sufficient to destroy all artificial fermentation. These strong acids protect the wort not only during fermentation but for months afterwards, whilst wort artificially fermented must be distilled immediately or else in a short time it would be corrupted by all kinds of microbes. 15

Fruits have another peculiarity, *viz.*, that of possessing natural ferments acclimatized to the special strong acidity of the juice, and fermentation by these produces besides alcohol abundant secretions of fatty acids and of peculiar flavours which are not produced artificially. In good spirits there are three categories of perfumes. 20

1. Those existing in the sweet juice before any fermentation.
2. Those formed during fermentation.
3. Those formed after fermentation by maturing.

The two latter are incontestably the most important, as the original aroma of the sweet juice is not preserved indefinitely and it rather destroys the delicacy of the product. I therefore aim at producing the two latter, and am even able by suitable operations to augment the secretions of the ferments and hasten the maturing. 30

Such is the basis of the processes which I am about to describe.

In some of the stages of manufacture I make use of methods previously known, but at other points I describe new methods of manufacture adapted to the new requirements. It is the combination of all these successive means which distinguishes the new invention. 35

1ST STAGE. ISOLATION OF THE ALCOHOLIC PRODUCING SUBSTANCE IN A PURE STATE.

As already mentioned, potatoes are treated for extracting the fecula, and cereals for extracting the starch by the ordinary processes. Sugar is extracted from beets by the usual methods as in the sugar industry. 40

2ND STAGE. SACCHARIFICATION OF THE STARCHY SUBSTANCES.

The fecula or starch is first treated with oxidizing agents to remove all the original odour as for instance with oxygenated water, ozone, or with bi-sulphites. 45

For saccharification the following is preferably employed:—

The requisite quantity of sulphuric acid at the rate of from one to one and a half *per cent.* on the dry starch. The first boiling takes place in the open air for liquefaction, and afterwards in an air-tight copper vessel for not longer than one and a half hours, the average time is about an hour. 50

After saturation with chalk the syrup is very slightly tinted. Then filtration through a filter and afterwards through animal charcoal and if necessary, through wood charcoal; it should then be completely colourless and inodorous.

3RD STAGE. COMPOSITION OF THE SWEET WORT.

It is necessary to approach as closely as possible to the composition of the 55

Barbel's Improved Manufacture of Alcoholic Spirits and Apparatus therefor.

juice of fruits, particularly as to acid and saline substances. Mineral acids are absolutely to be rejected.

The most convenient method of reproducing the juice of fruits is to make use of the lees of fruit juice from which the spirit has been distilled. It may appear difficult at first to obtain a sufficient quantity of these lees for the daily requirements in large manufacture, but it must be remembered that the original lees can be used at least five times or more; if certain special heating precautions are taken in the distilling. The principal difficulty is the tendency to burn and therefore the distilling apparatus must only be heated by steam. Moreover the colour and odour of caramel can easily be removed from the liquor either by certain defecants or by a small quantity of animal charcoal previously washed in acid. With these precautions the worts can be used over again a considerable number of times.

I do not confine myself to these means but reserve the right of making additions either of cream of tartar or citric or malic acid, or of phosphate of ammonia and the like, according to circumstances.

The addition of a certain proportion of wine or cider is not all waste as these liquors contribute their contingent of spirit. Finally, dry raisins, figs, preserved or fresh apples may be utilized.

4TH STAGE. FERMENTATION.

I reserve the right of using the processes of fermentation by pure cultures and continuous fermentation for which I applied for Letters Patent on the Eighth day of August 1899 No. 16159. Those improvements were invented in view of my new industrial system of alcoholisation, notably the production of aerated yeast for giving it the maximum of activity and vitality in very acid worts. I repeat that the purity of fermentations and the high percentage of alcohol in brandy are the direct outcome of the special organic acidity of the grape must.

5TH STAGE. MATURING OF THE WINES BEFORE DISTILLATION.

Experience has shewn me that it is extremely difficult to produce forced maturing in spirits after or during distillation; I have however for the most part obviated the difficulty by maturing the fermented liquid before it is distilled. It is well known that the manufacturers of natural brandies and rums attach the greatest importance to the manner in which the heating of the alembic is conducted. Much better results are obtained when the distillation is conducted very slowly. The improvement evidently results from the various elements constituting the fermented liquid having the time to combine their perfumes, thus forming an agreeable aroma.

My new process is designed to increase the effect of a protracted operation without however delaying the still to an unreasonable extent. It suffices to heat the liquors prior to distillation and to keep them at a high temperature for a considerable time.

The Pasteurization of wines in which their temperature is only raised to 67° and for rather a short time already matures the wines to a considerable extent; there is nothing to prevent the use of higher temperatures and greatly prolonging the operation.

Thus, after the vats C or fermentation tuns (see the accompanying drawing) we arrange two, three, or four closed vats, B¹, B², B³, the whole capacity of which represents a half day's or even a whole day's work. Each vat B is preceded by a tubular heater, A¹, A², A³. The liquor is drawn by a pump P from the fermentation tun and driven through the first heater A¹ into the vat B¹. In the tubular casing of A¹ hot water can be circulated coming from the cooling of the still, and thus giving a preliminary heating to the liquid without any expenditure of fuel. The temperature of the liquid in B¹ can thus attain at least to 50°. The heaters A², A³ are heated by the waste steam or the escaped vapours, the admission of which is so regulated as to attain the best temperature.

Barbet's Improved Manufacture of Alcoholic Spirits and Apparatus therefor.

The vats B¹, B², B³ are to be placed as much as possible on a higher level than that of the still, so that the charging can take place rapidly. This does not impede the continuous entrance of the liquor into the heater A¹, it is necessary in fact to have a continuous and regular passage through the heaters to keep the temperatures chosen regular. 5

Whatever the character that it is sought to give to the spirits (that of wine, of cider, of cane sugar and the like) the process of heating the liquor will produce the same results. Before their entrance into the alembic, the combination of fatty or organic acids and alcohol for forming ethers will have been introduced, and the other normal results of a properly conducted process will have been produced, and consequently the distilled product will present superior qualities of taste and odour. 10

I reserve particularly the means described for effecting this Pasteurisation of wine, and also the right of varying the proportions, the duration of the heating, the temperature in the vats, the number of vats, according to the nature of the products and the practical results in each case. 15

The following is another and very important improvement. Carbonic acid plays a very important part in the creation of perfumes and even etherification. In the first place it is an excellent vehicle for perfumes: there is nothing more delicious than the fumes of fermentations of fruit, whatever they may be, and nothing more characteristic also than the whiffs of carbonic acid gas which escape from the liquid at the beginning of the heating process. It is a pity to lose these fresh aromas, and some have endeavoured to capture them by causing the gases from the fermentation vats to pass into a liquid slightly alcoholized. 20 25

My method is a different one.

After the last vessel for Pasteurizing the wine, I place a copper air-tight vessel L. This vessel may, for example, contain the exact charge of the still boiler M. It is tested for one kilo. and provided with a safety valve lifting at this pressure. The fermentation gas is collected by means of a pump S and it is driven into a tube located at the bottom of the vat. The hot wine is saturated with the carbonic gas under pressure by means of the temperature, and the pressure excites the mingling of perfumes desired. 30

I reserve the right of adding to the carbonic acid gas injected a trace of sulphurous acid: this gas appearing also to have a favourable influence on distilled spirits, or any other gaseous or vapourous substance, the effect of which would be advantageous. 35

6TH STAGE. DISTILLATION.

This is effected by means of one of the numerous apparatuses already known either continuous or intermittent, which give a choice of the various volatile components of a wine and allow what is bad to be taken out, and which is good to be mixed together again. 40

The product of the distillation can be rectified if desired.

My system of manufacture, however, requires no further rectification and it need only be employed for those who desire alcohol absolutely without odour. 45

7TH STAGE. MATURATION.

I return to the old established maturing of the products in tuns and casks. Whatever the size of the works, this is not an impossibility as we see the immense distilleries of Scotland, Ireland and America make their whisky in this manner. Obviously it increases the expense of manufacture but the result obtained compensates therefor. The fermentations of the Anglo-Saxons in fact, are very mediocre and entirely industrial, and produce at the time very impure and undrinkable grain spirit, but their system of maturing is so efficacious that their products become good at the end of some years, so that the English and 50

Barbel's Improved Manufacture of Alcoholic Spirits and Apparatus therefor.

Americans sometimes prefer them to my brandies. I wish to imitate the Anglo-Saxons who hardly rectify at all, although making industrial use for distilling of substances such as maize, but at the same time I wish to do better. I claim that our products as they come from the still are already agreeable

5 and fruity, and that these perfumes, owing to the elimination of the odours of the original substance and artificial production of perfume by a new fermentation, unite to make kinds of cognac whisky, calvados whisky, kirsch whisky and plum whisky, and the like, well manufactured, healthy, agreeable and cheaper than cognacs and other authentic brandies. I have indicated the
10 manner in which the onerous period of maturing is shortened by means of heating the liquors before distillation. I can also have recourse to means already used for whisky, it is a question of storage, and my manufacturers can easily find warehouses to take charge of their goods.

The products of my process may be sold with a guarantee that they are free
15 from blending and from additions of essences which are the terror of hygienists. The spirit will be absolutely natural, as it comes out of the alembic except the maturing in the cask as is always done for brandies.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what
20 I claim is:—

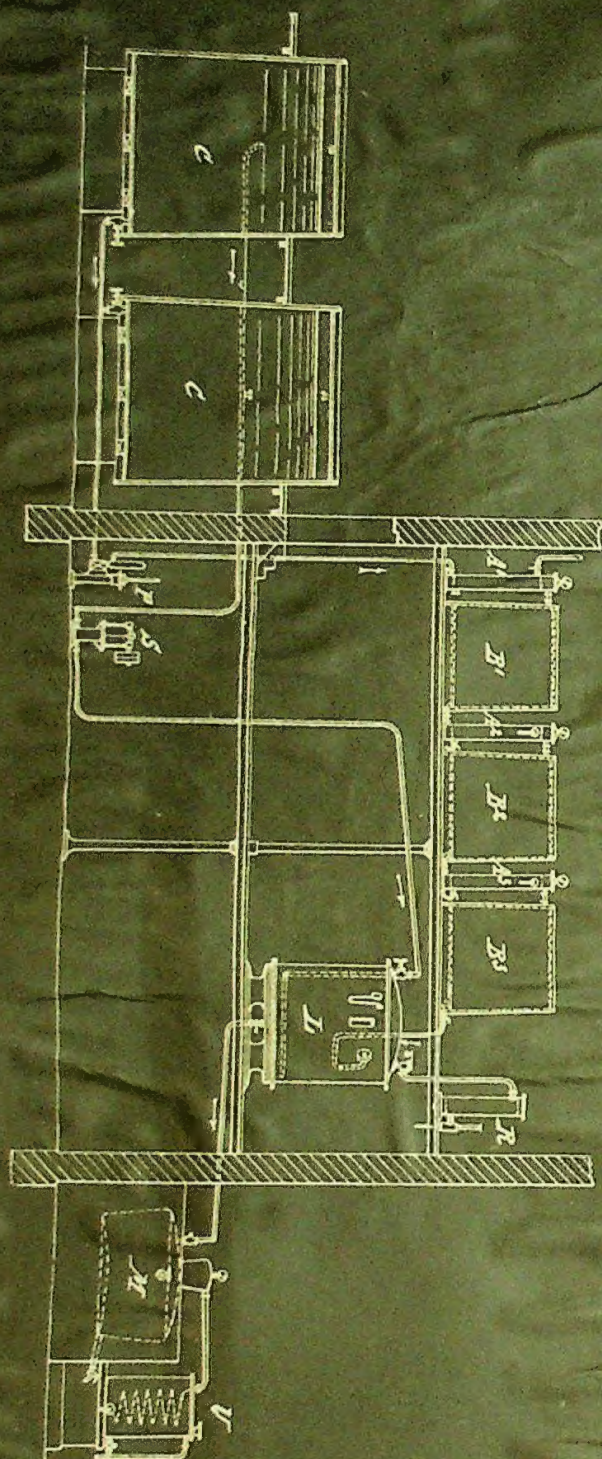
The improved process for the production of alcohol on an industrial scale, consisting of the combination of operations hereinbefore described forming a novel process having as its object the production of a novel industrial product of the type of Pasteurised whisky cognac, substantially as set forth.

25 Dated the 9th day of August 1899.

W. P. THOMPSON & Co.,
322, High Holborn, London, W.C., Patent Agents for the Applicant.

A.D. 1899. Aug. 9. N^o. 16,233.
BARBET'S COMPLETE SPECIFICATION.

(1 SHEET)



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N° 16,233



A.D. 1899

Date of Application, 9th Aug., 1899—Accepted, 28th Apr., 1900

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- A hundred years ago only spirits of wines, cider, cherries, cane sugar and molasses were known which were obtained by rude and elementary processes including so-called "spontaneous" fermentations and alembical distillation.
- 10 When industrial distilling made its way finding its raw materials in cheap and abundant agricultural products such as grain, potatoes, beet-roots, artichokes and the residues of sugar (molasses), recourse was had to much more complicated processes. In addition to the introduction of the preliminary saccharification for amylaceous substances, distillers endeavoured to make rapid
- 15 industrial fermentations by introducing beer-yeast to effect continuous distillation and finally to purify the product (which hardly resembled natural spirits) by rectifying, filtering and treating it chemically or electrically, or adding perfumes and the like.

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- 25 however, shews that it was not expected to have any special qualities and all that was aimed at was as few defects as possible.

- The processes which are about to be described are intended to give a fresh direction to industrial distilling; and will result in producing genuine spirit with a delicate flavour as of old, from any cheap agricultural raw
- 30 materials. For this it suffices to follow the ancient processes more closely and to adopt the modern operations thereto, a course from which operators had totally deviated.

- In my preliminary experiments I only considered the possibility of increasing the production of the distillery operated by the vineyard proprietor, and indicated methods of making at the 2nd, 3rd, or 4th distillation of the grape marc
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[Price 8d.]

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When this has been done, it is necessary to reproduce the fermentation of fruits, specially imitating that of those fruits, the flavour of which it is desired to reproduce. 10

The generic characteristic of all natural fermentations of fruits is that they are protected against bacteria and bad odours which result therefrom by considerable organic acidity. Tartaric acid and bi-tartrates in grapes malic acid in apples, citric or tannic acid in other fruits; the percentage of all these acids is tolerably high; one quarter of their equivalent in sulphuric acid would 15 however be sufficient to destroy all artificial fermentation. These strong acids protect the wort not only during fermentation but for months afterwards, whilst wort artificially fermented must be distilled immediately or else in a short time it would be corrupted by all kinds of microbes.

Fruits have another peculiarity, viz., that of possessing natural ferments 20 acclimatized to the special strong acidity of the juice, and fermentation by these produces besides alcohol abundant secretions of fatty acids and of peculiar flavours which are not produced artificially. In good spirits there are three categories of perfumes.

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The two latter are incontestably the most important, as the original aroma of the sweet juice is not preserved indefinitely and it rather destroys the delicacy of the product. I therefore aim at producing the two latter, and am 30 even able by suitable operations to augment the secretions of the ferments and hasten the maturing.

Such is the basis of the processes which I am about to describe.

In some of the stages of manufacture I make use of methods previously known, but at other points I describe new methods of manufacture adapted to 35 the new requirements. It is the combination of all these successive means which distinguishes the new invention.

1ST STAGE. ISOLATION OF THE ALCOHOLIC PRODUCING SUBSTANCE IN A PURE STATE.

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2ND STAGE. SACCHARIFICATION OF THE STARCHY SUBSTANCES.

The fecula or starch is first treated with oxidizing agents to remove all the original odour as for instance with oxygenated water, ozone, or with bi-sulphites. 45

For saccharification the following is preferably employed:—

The requisite quantity of sulphuric acid at the rate of from one to one and a half *per cent.* on the dry starch. The first boiling takes place in the open air for liquefaction, and afterwards in an air-tight copper vessel for not longer than one and a half hours, the average time is about an hour. 50

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I reserve the right of using the processes of fermentation by pure cultures and continuous fermentation for which I applied for Letters Patent on the Eighth day of August 1899 No. 16159. These improvements were invented in view of my new industrial system of alcoholisation, notably the production of aerated yeast for giving it the maximum of activity and vitality in very acid worts. I repeat that the purity of fermentations and the high percentage of alcohol in brandy are the direct outcome of the special organic acidity of the grape must.

5TH STAGE. MATURING OF THE WINES BEFORE DISTILLATION.

Experience has shown me that it is extremely difficult to produce forced maturing in spirits after or during distillation; I have however for the most part obviated the difficulty by maturing the fermented liquid before it is distilled. It is well known that the manufacturers of natural brandies and rums attach the greatest importance to the manner in which the heating of the alembic is conducted. Much better results are obtained when the distillation is conducted very slowly. The improvement evidently results from the various elements constituting the fermented liquid having the time to combine their perfumes, thus forming an agreeable aroma.

My new process is designed to increase the effect of a protracted operation without however delaying the still to an unreasonable extent. It suffices to heat the liquors prior to distillation and to keep them at a high temperature for a considerable time.

The Pasteurization of wines in which their temperature is only raised to 67° and for rather a short time already matures the wines to a considerable extent; there is nothing to prevent the use of higher temperatures and greatly prolonging the operation.

Thus, after the vats C or fermentation tuns (see the accompanying drawing) we arrange two, three, or four closed vats, B¹, B², B³, the whole capacity of which represents a half day's or even a whole day's work. Each vat B is preceded by a tubular heater, A¹, A², A³. The liquor is drawn by a pump P from the fermentation tun and driven through the first heater A¹ into the vat B¹. In the tubular casing of A¹ hot water can be circulated coming from the cooling of the still, and thus giving a preliminary heating to the liquid without any expenditure of fuel. The temperature of the liquid in B¹ can thus attain at least to 50°. The heaters A², A³ are heated by the waste steam or the escaped vapours, the admission of which is so regulated as to attain the best temperature.

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I reserve particularly the means described for effecting this Pasteurisation of wine, and also the right of varying the proportions, the duration of the heating, the temperature in the vats, the number of vats, according to the nature of the products and the practical results in each case.

The following is another and very important improvement. Carbonic acid plays a very important part in the creation of perfumes and even etherification. In the first place it is an excellent vehicle for perfumes: there is nothing more delicious than the fumes of fermentations of fruit, whatever they may be, and nothing more characteristic also than the whiffs of carbonic acid gas which escape from the liquid at the beginning of the heating process. It is a pity to lose these fresh aromas, and some have endeavoured to capture them by condensing the gases from the fermentation vats to pass into a liquid slightly alcoholized.

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After the last vessel for Pasteurizing the wine, I place a copper air-tight vessel L. This vessel may, for example, contain the exact charge of the still boiler M. It is tested for one kilo and provided with a safety valve lifting at this pressure. The fermentation gas is collected by means of a pump S and it is driven into a tube located at the bottom of the vat. The hot wine is saturated with the carbonic gas under pressure by means of the temperature, and the pressure excites the mingling of perfumes desired.

I reserve the right of adding to the carbonic acid gas injected a trace of sulphurous acid: this gas appearing also to have a favourable influence on distilled spirits, or any other gaseous or vaporous substance, the effect of which would be advantageous.

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This is effected by means of one of the numerous apparatuses already known either continuous or intermittent, which give a choice of the various volatile components of a wine and allow what is bad to be taken out, and which is good to be mixed together again.

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I return to the old established maturing of the products in tuns and casks. Whatever the size of the works, this is not an impossibility as we see the immense distilleries of Scotland, Ireland and America make their whisky in this manner. Obviously it increases the expense of manufacture but the result obtained compensates therefor. The fermentations of the Anglo-Saxons in fact, are very mediocre and entirely industrial, and produce at the time very impure and undrinkable grain spirit, but their system of maturing is so efficacious that their products become good at the end of some years, so that the English and

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Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what
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The improved process for the production of alcohol on an industrial scale, consisting of the combination of operations hereinbefore described forming a novel process having as its object the production of a novel industrial product of the type of Pasteurised whisky cognac, substantially as set forth.

25 Dated the 9th day of August 1899.

W. P. THOMPSON & Co.,

322, High Holborn, London, W.C., Patent Agents for the Applicant.